

U.S. Patent Application No. 10/773,244
Reply to Office Action of December 13, 2005

Docket No.: T2171.0214

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A wet etching method comprising ~~the steps of:~~
forming a silicon oxide film on one principal surface of a silicon substrate, and then forming a silicon nitride film on the silicon oxide film, a thickness T_o of said silicon oxide film and a thickness T_n of said silicon nitride film being set to have a film thickness ratio T_o/T_n of 1.25 or larger;

selectively etching a lamination layer of said silicon oxide film and said silicon nitride film to form an etching mask made of a left from the remaining region of said lamination layer; and

selectively and anisotropically etching said silicon substrate with alkali etchant by using said etching mask.

2. (Original) The wet etching method according to claim 1, wherein said film thickness ratio T_o/T_n is set in a range from 1.60 to 3.21.

3. (Currently Amended) A wet etching method comprising ~~the steps of:~~
forming a silicon oxide film on one principal surface of a silicon substrate, and forming a silicon nitride film on the silicon oxide film;

selectively etching a lamination layer of said silicon oxide film and said silicon nitride film to form a mask opening through a partial region of said lamination layer and to form an etching mask made of a left from the remaining region of said lamination layer;

after or before said etching mask is formed, forming at least one film stress relaxing groove partially in said silicon nitride film, said film stress relaxing groove relaxing film stress applied to said mask opening; and

selectively and anisotropically etching said silicon substrate with alkali etchant by using said etching mask.

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4. (Original) The wet etching method according to claim 3, wherein said at least one film stress relaxing groove is formed surrounding said mask opening.
5. (New) The wet etching method according to claim 1, wherein said selective and anisotropic etching step forms a through hole penetrating a total thickness of the substrate.
6. (New) The wet etching method according to claim 5, further comprising forming an etch stopper film on the other principal surface of the silicon substrate.
7. (New) The etching method according to claim 6, wherein said selective and anisotropic etching step leaves the etch stopper film.
8. (New) The etching method according to claim 7, wherein said alkali etchant is TMAH solution.
9. (New) The etching method according to claim 8, wherein said etch stopper film is comprised of silicon nitride.
10. (New) The etching method according to claim 7, wherein said alkali etchant is potassium hydroxide solution.
11. (New) The wet etching method according to claim 3, wherein said at least one film stress relaxing groove comprises a pair of portions opposing to each other across said mask opening.
12. (New) The wet etching method according to claim 11, wherein said mask opening has rectangular shape, and said pair portions are located on an diagonal line of said rectangular shape.

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13. (New) The wet etching method according to claim 11, wherein said at least one film stress relaxing groove has a lattice pattern.
14. (New) The wet etching method according to claim 11, wherein said mask opening has a rectangular shape having four edges, and said at least one film stress relaxing groove has sides not parallel to the edges of said mask opening.
15. (New) The wet etching method according to claim 11, wherein said at least one film stress relaxing groove has a width of 10 μm or wider.
16. (New) The wet etching method according to claim 11, wherein a distance between said mask opening and said at least one film stress groove is 100 μm or longer.
17. (New) The wet etching method according to claim 11, wherein said at least one film stress relaxing groove surrounds said mask opening.
18. (New) The wet etching method according to claim 11, wherein said mask opening has corners, said at least one film stress relaxing groove has portions located near the corners.
19. (New) The wet etching method according to claim 11, further comprising forming an etch stopper film on the other principal surface of the silicon substrate, wherein said selective and anisotropic etching step forms a through hole penetrating a total thickness of the substrate, leaving the etch stopper film.
20. (New) The etching method according to claim 19, wherein said alkali etchant is TMAH solution.